

## WE CLAIM:

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1. Apparatus for performing process chemistry reactions in a plurality of reaction vessels comprising: a base, said base comprising a frame with a wall defining an insert receiving opening, an insert adapted to be removeably received within said opening, said insert comprising an array of reaction vessel receiving recesses; a plate having an array of openings adapted to be aligned with the said recesses, respectively, a septum and means for mounting said plate and said septum above said base, spaced from said insert, with said reaction vessels situated therebetween. *1 insert*
  2. Apparatus for performing process chemistry reactions in a plurality of reaction vessels comprising: a base, said base comprising a frame with a wall defining an insert receiving opening, first and second inserts adapted to be interchangeably removeably received within said opening, each of said inserts comprising an array of reaction vessel receiving recesses, a plate having an array of openings adapted to be aligned with the said recesses, respectively, a septum and means for mounting said plate and said septum above said base, spaced from said received insert, with said reaction vessels situated therebetween. *2 inserts*
  3. The apparatus of Claims 1 or 2 adapted for use with a standard automated liquid handler capable of dispensing liquid to a plurality of preset locations, wherein said insert recesses are arranged so as

to align with the liquid dispenser locations when said insert is received within said frame opening.

4. The apparatus of Claims 1 wherein said insert has at least 48 recesses.

5. The apparatus of Claim 4 wherein each of said recesses is adapted to receive a 11.6 mm reaction vessel.

6. The apparatus of Claims 1 wherein said insert has 24 recesses.

7. The apparatus of Claim 6 wherein each of said recesses is adapted to receive a 17 mm reaction vessel.

8. The apparatus of Claims 1 wherein said insert has 9 recesses.

9. The apparatus of Claim 8 wherein each of said recesses is adapted to receive a 24 mm reaction vessel.

10. The apparatus of Claims 1 wherein said insert has 6 recesses.

11. The apparatus of Claim 10 wherein each of said recesses is adapted to receive a 34 mm reaction vessel.

12. The apparatus of Claim 1 further comprising a second insert, said insert and said second insert being adapted to be interchangeably receivable within said frame opening.

13. The apparatus of Claims 1 or 2 wherein each of said recesses comprises a substantially conical portion.

14. The apparatus of Claims 1 or 2 wherein each of said recesses comprises a substantially semi-circular portion.

15. The apparatus of Claims 1 or 2 wherein each of said recesses comprises an opening.

16. The apparatus of Claim 14 wherein said opening is situated at the bottom of said recess.
17. The apparatus of Claims 1 or 2 wherein said frame comprises means for securing said base on a shaker table.
- 5 18. The apparatus of Claim 16 wherein said securing means comprises a slot.
19. The apparatus of Claims 1 or 2 for use in combination with a heat insulating pad upon which said frame is adapted to rest.
- 10 20. The apparatus of Claims 1 or 2 for use in combination with a heat conducting plate upon which said frame is adapted to rest.
21. The apparatus of Claims 1 or 2 wherein said frame comprises an internal channel having an entrance port and an exit port.
22. The apparatus of Claims 1 wherein said insert comprises a thermocouple receiving opening.
- 15 23. The apparatus of Claims 1 for use in combination with an insert extraction tool having a protrusion, wherein said insert comprises a protrusion receiving opening.
- 20 24. The combination of Claim 23 wherein said tool comprises means for changing said protrusion between an expanded state, to frictionally engage said protrusion receiving opening and a non-expanded state, to disengage said protrusion receiving opening.
25. The combination of Claim 24 wherein said protrusion is normally in the expanded state.

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26. The combination of Claim 24 wherein said tool further comprises means for maintaining said protrusion in the expanded state.

27. The combination of Claim 24 wherein said protrusion is normally in the non-expanded state.

5 28. The combination of Claim 24 wherein said tool comprises means for maintaining said protrusion in the non-expanded state.

29. The apparatus of Claims 1 wherein said frame opening and said insert are shaped such that said insert can be received within said opening in only a single orientation.

10 30. The apparatus of Claims 1 wherein said insert comprises first and second rounded corners.

31. The apparatus of Claim 30 wherein each of said first and second rounded corners of said insert has a radius and wherein the radius of said first insert corner is different than said radius of said second insert corner.

15 32. The apparatus of Claim 30 wherein said frame comprises first and second round corners.

33. The apparatus of Claim 31 wherein said frame comprises first and second round corners.

20 34. The apparatus of Claim 32 wherein each of said first and second rounded corners of said frame has a radius and wherein the radius of said first frame corner is different from the radius of said second frame corner.

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35. The apparatus of Claim 33 wherein the radius of said first insert corner corresponds to the radius of said first frame corner.
36. The apparatus of Claim 33 wherein the radius of said second insert corner corresponds to the radius of said second frame corner.
37. The apparatus of Claims 1 wherein said frame has a bottom surface and said frame wall is inclined relative to a line perpendicular to the bottom surface of said frame.
38. The apparatus of Claims 1 wherein said insert comprises an outer wall and a bottom surface and wherein said outer wall is inclined relative to a line perpendicular to said bottom surface.
39. The apparatus of Claim 37 wherein said insert comprises an outer wall and a bottom surface and wherein said outer wall is inclined relative to a line perpendicular to said bottom surface.
40. The apparatus of Claim 39 wherein the inclination of said frame wall corresponds to the inclination of said insert wall.
41. The apparatus of Claim 37 wherein the inclination of said frame wall is approximately one degree.
42. The apparatus of Claim 38 wherein the inclination of said insert wall is approximately one degree.
43. The apparatus of Claims 1 wherein said insert wall comprises an outwardly extending lip adapted to rest on said frame.
44. The apparatus of Claims 1 or 2 wherein said frame comprises a channel through which a temperature control fluid is adapted to flow to control the temperature of the lower portions of the vessels and

further comprising a temperature control module adapted to be interposed between said frame and said plate, surrounding said reaction vessels, to control the temperature of the upper portions of the vessels.

5 45. The apparatus of Claims 1 or 2 for use in combination with magnetic stirrer means upon which said frame is adapted to be situated, further comprising a magnetic stir bar situated within a reaction vessel.

10 46. The combination of Claim 45 wherein said magnetic stirrer means comprises a body with an opening, an impeller freely rotatably received within said opening, magnetic means associated with said impeller and means for rotating said impeller.

15 47. The combination of Claim 46 wherein said rotating means comprises flow means, said flow means comprising an input port in said stirrer means body, a first channel within said stirrer body extending between said input port and said impeller receiving opening, an output port in said stirrer body and a second channel within said stirrer body extending between said impeller receiving opening and said output port.

20 48. The combination of Claim 46 wherein said rotating means further comprises a second opening in said stirrer body, a second impeller freely rotatably received within said second opening in said stirrer body, second magnetic means associated with said second impeller

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and means for operably connecting said second opening between said first and said second channels.

49. The combination of Claim 47 comprising means for regulating the flow to said impeller receiving openings such that the flow to said openings is approximately equal.

50. The apparatus of Claim 45 wherein said reaction vessel has an inner diameter and said stir bar is longer than said inner diameter of said reaction vessel.

51. The apparatus of Claim 45 for use in combination with a shaker platform with upstanding pins, wherein said stirrer means base comprises means for engaging said shaker platform pins.

52. The combination of Claim 45 for use in combination with a thin, electrically heated plate adapted to be interposed between said frame and said stirrer means.

53. A reaction vessel carrying insert adapted for use in apparatus for performing parallel chemistry reactions, the apparatus having a base comprising a frame with a wall defining an insert receiving opening, said insert being adapted to be removably received within said insert receiving opening in only a single orientation and comprising an array of reaction vessel receiving recesses.

54. The insert of Claim 53 adapted for use in combination with a standard automatic liquid handler capable of dispensing liquid to a plurality of preset locations, wherein said recesses are located so as

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to align with the preset liquid dispenser locations when said insert in received in said frame.

55. The insert of Claim 53 wherein said insert has at least 48 recesses.

56. The insert of Claim 55 wherein each of said recesses is adapted to receive an 11.6 mm reaction vessel.

57. The insert of Claim 53 wherein said insert has 24 recesses.

58. The insert of Claim 57 wherein each of said recesses is adapted to receive a 17 mm reaction vessel.

59. The insert of Claim 53 wherein said insert has 9 recesses.

60. The insert of Claim 59 wherein each of said recesses is adapted to receive a 24 mm reaction vessel.

61. The insert of Claim 53 wherein said insert has 6 recesses.

62. The insert of Claim 61 wherein each of said recesses is adapted to receive a 34 mm reaction vessel.

63. The insert of Claim 53 for use with a second insert, said insert and said second insert being adapted to be interchangeably received within said frame opening.

64. The insert of Claim 53 wherein each of said recesses comprises a substantially conical portion.

65. The apparatus of Claim 53 wherein each of said recesses comprises a substantially semi-circular portion

66. The insert of Claim 53 wherein each of said recesses comprises an opening.



67. The insert of Claim 66 wherein said opening is situated at the bottom of said recess.

68. The insert of Claim 53 wherein said insert comprises a thermocouple receiving opening.

5 69. The insert of Claim 53 for use in combination with an extraction tool having a protrusion and wherein said insert comprises a protrusion receiving opening.

10 70. The combination of Claim 69 wherein said tool comprises means for expanding said protrusion to frictionally engage said protrusion receiving opening.

71. The combination of Claim 70 wherein said tool further comprises means for maintaining said protrusion in said expanded state.

72. The insert of Claim 53 wherein said insert comprises first and second rounded corners.

15 73. The insert of Claim 72 wherein each of said rounded corners of said insert has a radius and wherein the radius of said first insert corner is different than said radius of said second insert corner.

20 74. The insert of Claim 53 wherein said insert comprises an outer wall and a bottom and wherein said outer wall is inclined relative to a line perpendicular to said bottom.

75. The insert of Claim 74 wherein the inclination of said insert wall is approximately one degree.

76. Magnetic stirrer means for use in combination with a parallel chemistry reactor, said stirrer means comprising a body with an

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opening, an impeller freely rotatably received within said opening, magnetic means associated with said impeller and means for rotating said impeller.

5 77. The stirrer means of Claim 76 wherein said means for rotating comprises flow means through said stirrer means body, said flow means comprising an input port in said stirrer body, a first channel within said stirrer body extending between said input port and said impeller receiving opening, a output port in said stirrer body and a second channel within said stirrer base extending between said  
10 impeller receiving opening and said output port.

78. The stirrer means of Claim 77 wherein said rotating means further comprises a second opening in said stirrer body, a second impeller freely rotatably received within said second opening in said stirrer body, second magnetic means associated with second impeller and  
15 means for operably connecting said second opening between said first and said second channels.

79. The stirrer means of Claim 77 comprising means for regulating the flow to said impeller receiving openings such that the flow to said openings is approximately equal.

20 80. The stirrer means of Claim 76 for use in combination with a shaker platform with upstanding pins, wherein said stirrer body comprises means for engaging said shaker platform pins.

81. An extraction tool for use with a vessel receiving insert adapted to be removably received within an opening in the frame of modular

apparatus for performing parallel chemistry reactions, said insert comprising a recess, said tool comprising an expandable protrusion and means for causing said protrusion to change between an expanded state, wherein said protrusion engages said recess, and a non-expanded state, wherein said recess is released.

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82. The tool of Claim 81 further comprising means for maintaining said protrusion in said expanded state.

83. The tool of Claim 82 wherein said protrusion comprises first and second sections each having a surface and said maintaining means comprises a ball and spring means urging said ball to cooperate with said surfaces to move said sections of said protrusion apart.

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84. The tool of Claim 81 further comprising means for maintaining said protrusion in said non-expanded state.

85. The tool of Claim 84 wherein said protrusion comprises first and second sections and said maintaining means comprises a pin and spring means urging said pin to move from a position between said sections.

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